Flinted Rock

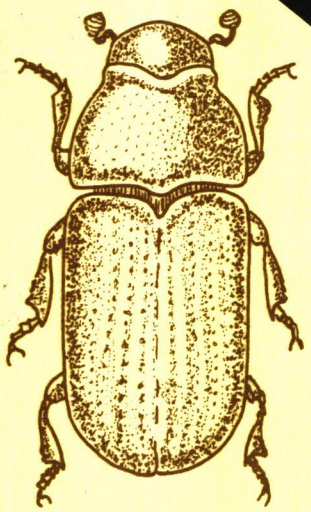
SB761
U757
77-9

TECHNICAL REPORT R-3 77-9

SIMULATED YIELD TABLES FOR DWARF MISTLETOE MANAGEMENT IN PONDEROSA PINE STANDS (SWYLD2 PROGRAM)

Navajo Indian Reservation
Arizona

1977



Southwestern Region

U. S. DEPARTMENT OF AGRICULTURE

FOREST SERVICE

LIBRARY

MAR 15 1977

ROCKY MOUNTAIN STATION

5200

R-3 77-9

TECHNICAL REPORT

SIMULATED YIELD TABLES FOR DWARF MISTLETOE MANAGEMENT IN PONDEROSA PINE STANDS (SWYLD2 PROGRAM)

PHASE I. YIELD TABLE SYNTHESIS: AN AID TO SILVICULTURAL PRESCRIPTIONS

Navajo Indian Reservation
Arizona

1977

Forest Insect and Disease Management
State and Private Forestry
Southwestern Region, Forest Service, USDA
517 Gold Avenue, SW
Albuquerque, New Mexico 87102

Prepared by:

James W. Walters

JAMES W. WALTERS, Plant Pathologist
Forest Insect and Disease Management

APPROVED BY:

Donald P Graham

DONALD P. GRAHAM, Director
Forest Insect and Disease Management

Thomas G Schmeckpeper

THOMAS G. SCHMECKPEPER
Deputy Regional Forester
State and Private Forestry

INTRODUCTION

Southwestern dwarf mistletoe (Arceuthobium vaginatum subsp. cryptopodum) is the most destructive forest disease in the Southwest. This disease causes growth loss, mortality, deformity, and reduced seed production in infected trees. Timber volume yield is reduced proportionate to the level of mistletoe infestation in a stand. Volume loss in an infested stand may be 10 to 40 percent or more over a rotation. Silvicultural control of dwarf mistletoe is the most efficient method of reducing adverse effects caused by this disease. Removal of mistletoe-infected trees during precommercial and commercial thinning operations is an efficient way to suppress a dwarf mistletoe infestation.

Timber volume loss resulting from a dwarf mistletoe infestation is difficult to assess by direct observation. The effectiveness of silvicultural treatments that reduce mistletoe levels is variable. Researchers have developed a simulated yield program (SWYLD2) that will aid land managers in assessing these problems (Myers, Edminster, and Hawksworth 1976). The SWYLD2 program is designed for use in even-aged or two-storied stands of ponderosa pine. Stands may be either dwarf mistletoe-infested or non-infested. Yield tables generated by the SWYLD2 program help the land manager evaluate management alternatives through examination of yields produced under such alternatives.

The SWYLD2 program is being evaluated for implementation in the Southwestern Region. Areas were selected in various parts of the Region for development of simulated yield tables in mistletoe-infested stands. The program for implementation of SWYLD2 consists of three phases: I. synthesis of yield tables for selected stands infested with dwarf mistletoe, II. evaluation of these stands managed with the aid of SWYLD2 simulations, and III. implementation of SWYLD2 in timber management programs of the Southwestern Region. This report is one of a series to be issued during the implementation process.

OBJECTIVE

The purpose of this project was to synthesize yield tables for a two-storied, dwarf mistletoe-infested ponderosa pine stand on the Navajo Indian Reservation. This report summarizes Phase I of the SWYLD2 implementation program on the Reservation.

PROCEDURE

The following procedure constituted Phase I of this project:

1. Collect data necessary for input in the SWYLD2 program from a two-storied, dwarf mistletoe-infested ponderosa pine stand on the Navajo Indian Reservation.

2. Combine data with various management alternatives selected by the land manager and produce simulated yield tables for the sampled area.

3. Assist the land manager in interpreting yield tables and selecting the best combination of management alternatives in a dwarf mistletoe-infested stand.

4. Assist the land manager in planning implementation of selected management alternatives.

METHODS

An area of two-storied ponderosa pine infested with dwarf mistletoe on the Navajo Indian Reservation was sampled in 1976 by personnel from the Forest Insect and Disease Management Staff Unit and the Bureau of Indian Affairs.

Sampling Procedure

1. A road log was made from Fort Defiance, Arizona, to the survey area.

2. A map of the area was obtained and the boundary marked.

3. Age (at d.b.h.) and height measurements were taken on 20 codominant or dominant ponderosa pine trees in each of the two stories.

4. Site index measurements were taken on 12 dominant ponderosa pines within the area sampled.

5. Sample points were located on an 8-chain grid pattern throughout the area; a .01-acre circular plot was established at each sample point; presence or absence of dwarf mistletoe and d.b.h. were recorded for all live trees 4.5 feet or more in height and less than 6 inches d.b.h.; at the same sample point, a 10 BAF variable-size plot was established; the same variables as in the fixed plot were recorded for live trees 6 inches or greater d.b.h.; data were recorded on key-punchable forms for rapid processing.

6. Survey data were first processed through the NSEC/VI computer program, which summarized field data and provided estimates on a per-acre basis by 1-inch diameter classes for number of trees, basal area, and percent trees infected with dwarf mistletoe; site index, mean d.b.h. of the tree of average basal area, average age, and average height were determined with a portable calculator. The summarized data were combined with management alternatives obtained from land managers and then processed through the simulated yield program SWYLD2.

RESULTS AND DISCUSSION

A 3,821-acre area of two-storied ponderosa pine on the Navajo Indian Reservation was sampled by collecting data on 597 plots. Area sampled, line, plot, and dwarf mistletoe distribution are provided in Figure 1. Plots with dwarf mistletoe had a minimum of one infected sample tree.

Survey Results Summary

	Overstory*	Understory**
Site index	77	77
Average age (years)	230	70
Average height (feet)	87	48
No. trees/acre	26	986
Basal area/acre	46	28
Average d.b.h. (inches)	17.9	2.3
Percent trees infected with dwarf mistletoe	17	4

This basic stand information was combined with management alternatives selected by BIA Forestry personnel to produce 14 sets of simulated yield tables. The yield tables were discussed and evaluated with BIA Forestry personnel. Seven yield tables were selected for use as examples in this report. Management alternatives for the overstory were the same for all simulations; thus, only one printout is presented (Table 1). Simulated yields for the overstory were projected for 20 years, with half the basal area being removed at the present time and the remainder carried to rotation (Table 1).

Tables 2 to 7 provide simulations for the understory portion of the stand. Several important concepts are revealed by comparing the understory yield simulations. Understory simulations were projected

*Overstory = all live trees $\geq$ 11 inches d.b.h.
**Understory = all live trees $\geq$ 4.5 feet in height and $<$ 11 inches d.b.h.

over a 170-year rotation. All management alternatives were constant, except the initial and subsequent thinning intensities and presence or absence of dwarf mistletoe. Half the simulations were made with no dwarf mistletoe present in the stand (Tables 3, 5, & 7). By simulating no mistletoe, a comparison can be made of the effects of dwarf mistletoe in a managed stand (Tables 2, 4, & 6 vs. 3, 5, & 7). Presence or absence of dwarf mistletoe in the simulations had little effect on total yields. Effects of dwarf mistletoe were reduced because the disease was controlled at all thinning levels. Also, the initial level of dwarf mistletoe was very low.

Board-foot yields in mistletoe-infested stands sometime exceed those in a replicate simulation without dwarf mistletoe (Tables 4 & 5 vs. 6 & 7). This occurs because the SWYLD2 program discriminates against infected trees; consequently, larger diameter trees are removed in the simulation. Dwarf mistletoe is more prevalent in older, larger trees because they have been exposed to the disease for a longer period of time. The progressive increase in total board-foot volume per acre (Tables 2, 4, & 6) resulted from increasing the GSL's in initial and subsequent thinnings. Too many trees were thinned in the first stand entry (Tables 2 & 4), resulting in inadequate growing stock to obtain maximum volume production. Examination of yield tables will aid land managers in selecting the combination of management alternatives that best meet current objectives.

CONCLUSIONS AND RECOMMENDATIONS

Sufficient stand data were obtained on the Navajo Indian Reservation for use of the simulated yield program SWYLD2. The data were combined with various management alternatives selected by BIA Forestry personnel, and yields were simulated for the sampled area. The SWYLD2 program is a potentially useful tool for land managers. Limits of this program will be revealed after post-treatment evaluations of on-the-ground situations, in which simulated yield information has been used, are compared with pre-treatment simulated yields (Phase II).

Based on results of this report, the following plan of action is recommended for the area sampled:

1. Select the set of yield tables and accompanying management alternatives that best meet current management objectives, while reducing dwarf mistletoe to acceptable levels.

2. Implement the management alternatives selected for the first stand entry in overstory and understory.

3. With the assistance of personnel from the Forest Insect and Disease Management Staff Unit, complete a post-treatment evaluation on the understory of the area.

4. Compare results of the post-treatment evaluation with simulated yield predictions (Phase II).

Instructions for use of the SWYLD2 program and detailed descriptions of management alternatives are provided by Edminster and Hawksworth (1976). Additional information pertaining to the SWYLD2 program may be obtained by contacting the Forest Insect and Disease Management Staff Unit.

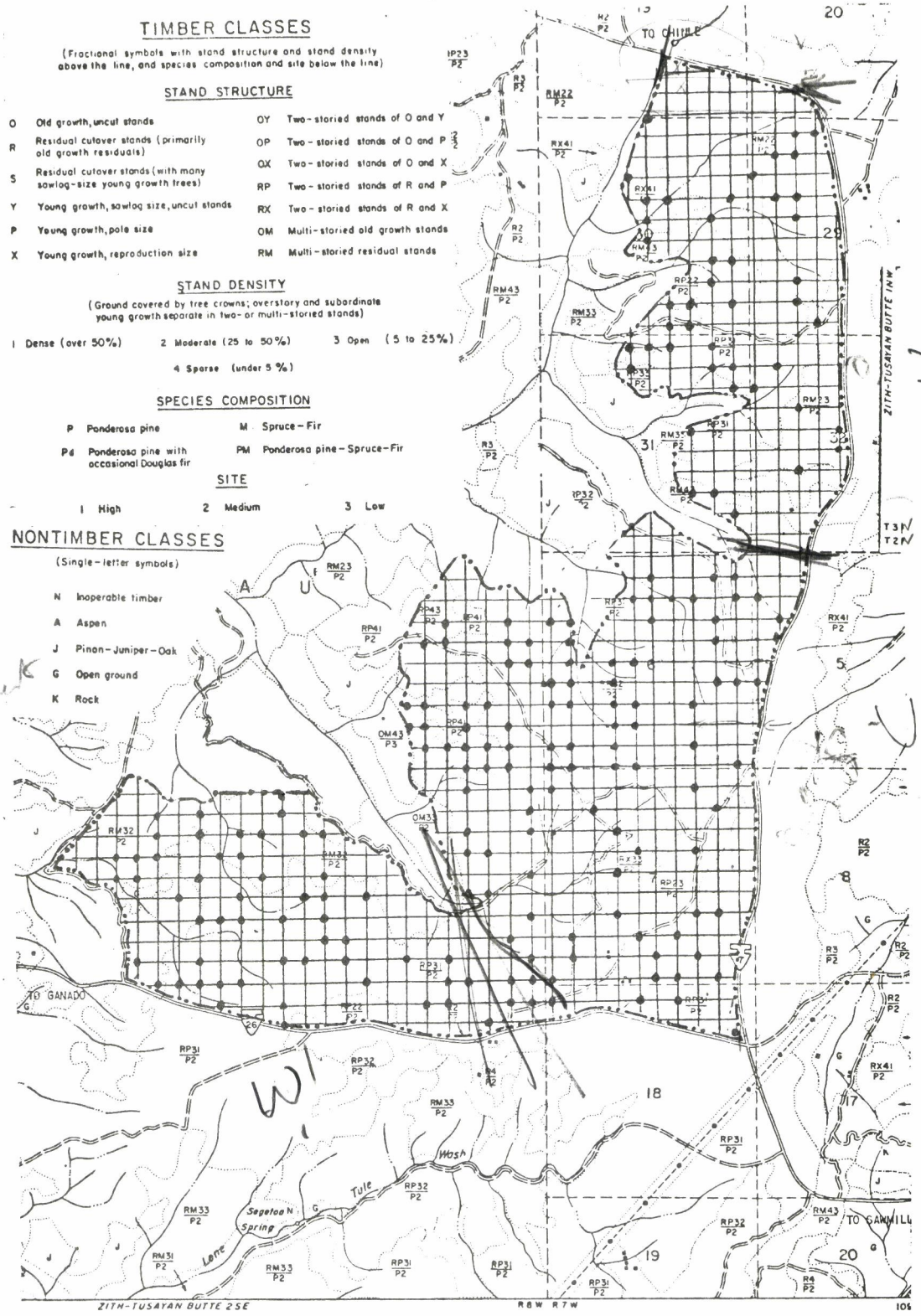
LITERATURE CITED

Edminster, C. B., and F. G. Hawksworth. 1976. User's guide to SWYLD2: Yield tables for even-aged and two-storied stands of southwestern ponderosa pine, including effects of dwarf mistletoe. USDA Forest Serv. Gen. Tech. Rep. RM-23. 8 pp.

Myers, C. A., C. B. Edminster, and F. G. Hawksworth. 1976. SWYLD2: Yield tables for even-aged and two-storied stands of southwestern ponderosa pine, including effects of dwarf mistletoe. USDA Forest Serv. Res. Pap. RM-163. 25 pp.

ACKNOWLEDGMENT

The author appreciates the technical assistance provided by Brian W. Geils in fieldwork and data processing required to complete this report. Acknowledgment is also given to field assistants from Forest Insect and Disease Management and the Bureau of Indian Affairs, Navajo Indian Reservation, for collection of field data.


TIMBER CLASSES
(Fractional symbols with stand structure and stand density above the line, and species composition and site below the line)
STAND STRUCTURE
O Old growth, uncut stands
R Residual cutover stands (primarily old growth residuals)
S Residual cutover stands (with many sawlog-size young growth trees)
Y Young growth, sawlog size, uncut stands
P Young growth, pole size
X Young growth, reproduction size
OY Two-storied stands of O and Y
OP Two-storied stands of O and P
OX Two-storied stands of O and X
RP Two-storied stands of R and P
RX Two-storied stands of R and X
OM Multi-storied old growth stands
RM Multi-storied residual stands
STAND DENSITY
(Ground covered by tree crowns; overstory and subordinate young growth separate in two- or multi-storied stands)
1 Dense (over 50%) 2 Moderate (25 to 50%) 3 Open (5 to 25%)
4 Sparse (under 5 %)
SPECIES COMPOSITION
P Ponderosa pine
Pd Ponderosa pine with occasional Douglas fir
M Spruce-Fir
PM Ponderosa pine-Spruce-Fir
SITE
1 High 2 Medium 3 Low
NONTIMBER CLASSES
(Single-letter symbols)
N Inoperable timber
A Aspen
J Pinon-Juniper-Oak
G Open ground
K Rock
TO CHINLE
TO GANADO
TO SAWMILL
ZITH-TUSAYAN BUTTE 2SE
ZITH-TUSAYAN BUTTE 1NW
R8W R7W
T3N
T2N
Segetoa Spring
Tule Wash
Lone

ZITH – TUSAYAN BUTTE 2 NE

SCALE 2"=1 MILE

0 1/2 1 2 Mi.

1976 FLUTED ROCK

MISTLETOE EVALUATION PROJECT MAP
NAVAJO INDIAN REGERVATION

Project Boundary ——·——·——
Project Acreage 3,821
Dwarf Mistletoe Infection Present ●

Figure 1

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 117., OVERSTORY.

SITE INDEX 77
THINNING INTENSITY-- INITIAL- 46. SUBSEQUENT- 46.

STND 117 FLUTED ROCK NAVAJO 76

		CHARACTERISTICS BEFORE AND AFTER THINNING							PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
230	.2	26	45	17.9	87	1500	1440	6800					
230	.0+	15	23	16.8	85	740	710	3200	11	22	760	730	3600
240	.1	15	28	18.5	86	920	880	4200					
250	.2	15	32	19.7	87	1050	1020	5100					
							TOTAL YIELDS				1810	1750	8700

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING FROM ABOVE ALLOWED IN STANDS WITH DWARF MISTLETOE.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 1. CUBIC FEET AND 1. BOARD FEET.
ALL THINNINGS MAY BE NONCOMMERCIAL.
AT INITIAL AGE 230., 17. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 1

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 117., UNDERSTORY.

SITE INDEX 77
THINNING INTENSITY-- INITIAL- 70. SUBSEQUENT- 80.

STND 117 FLUTED ROCK NAVAJO 76

CHARACTERISTICS BEFORE AND AFTER THINNING									PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
70	.1	986	28	2.3	48	980	0	0					
70	.0+	451	17	2.6	49	510	0	0	535	11	470	0	0
80	.1	448	54	4.7	58	1270	0	0					
90	.1	441	81	5.8	63	1920	870	0					
90	.0+	284	58	6.1	64	1370	720	0	157	23	550	150	0
100	.1	282	84	7.4	68	2050	1540	0					
110	.1	280	110	8.5	72	2840	2390	1900					
110	.0+	179	77	8.9	73	2020	1740	1800	101	33	820	650	100
120	.1	178	99	10.1	76	2760	2490	5400					
130	.1	178	120	11.1	79	3510	3200	10200					
130	.0+	100	56	10.1	78	1580	1420	2900	78	64	1930	1780	7300
140	.1	100	72	11.5	80	2150	1970	6800					
150	.1	100	88	12.7	83	2720	2530	9400					
150	.0+	41	28	11.1	80	810	740	2200	59	60	1910	1790	7200
160	.1	41	38	13.0	82	1160	1080	4100					
170	.1	41	48	14.7	84	1530	1450	5900					
							TOTAL YIELDS				7210	5820	20500

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 1. CUBIC FEET AND 1. BOARD FEET.
ALL THINNINGS MAY BE NONCOMMERCIAL.
AT INITIAL AGE 70., 4. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 2

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 117., UNDERSTORY.

SITE INDEX 77
THINNING INTENSITY-- INITIAL- 70. SUBSEQUENT- 80.

STND 117 FLUTED ROCK NAVAJO 76 NO DWARF MISTLETOE

		CHARACTERISTICS BEFORE AND AFTER THINNING							PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
70	.0	986	28	2.3	48	980	0	0					
70	.0	429	20	2.9	49	550	0	0	557	8	430	0	0
80	.0	426	45	4.4	55	1050	0	0					
90	.0	421	69	5.5	60	1610	690	0					
90	.0	284	58	6.1	61	1310	690	0	137	11	300	0	0
100	.0	282	84	7.4	65	1960	1480	0					
110	.0	280	110	8.5	69	2660	2240	2400					
110	.0	166	78	9.3	70	1970	1730	2400	114	32	690	510	0
120	.0	165	97	10.4	73	2620	2360	5800					
130	.0	165	117	11.4	76	3310	3030	10600					
130	.0	95	56	10.4	75	1530	1380	3200	70	61	1780	1650	7400
140	.0	95	72	11.8	77	2070	1910	6800					
150	.0	95	88	13.0	80	2620	2430	9200					
150	.0	39	28	11.4	77	790	720	2300	56	60	1830	1710	6900
160	.0	39	38	13.3	80	1120	1040	4000					
170	.0	39	48	15.0	81	1470	1390	5800					
							TOTAL YIELDS				6500	5260	20100

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 1. CUBIC FEET AND 1. BOARD FEET.
ALL THINNINGS MAY BE NONCOMMERCIAL.

Table 3

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 117., UNDERSTORY.

SITE INDEX 77
THINNING INTENSITY-- INITIAL- 70, SUBSEQUENT- 100,

STND 117 FLUTED ROCK NAVAJO 76

		CHARACTERISTICS BEFORE AND AFTER THINNING							PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
70	.1	986	28	2.3	48	980	0	0					
70	.0+	451	17	2.6	49	510	0	0	535	11	470	0	0
80	.1	448	54	4.7	58	1270	0	0					
90	.1	441	81	5.8	63	1920	870	0					
90	.0+	361	71	6.0	63	1680	840	0	80	10	240	30	0
100	.1	358	101	7.2	68	2460	1800	0					
110	.1	353	126	8.1	72	3170	2590	1400					
110	.0+	243	94	8.4	72	2400	2010	1300	110	32	770	580	100
120	.1	241	116	9.4	76	3200	2820	4400					
130	.1	239	138	10.3	78	4020	3620	8900					
130	.0+	144	68	9.3	77	1900	1670	2200	95	70	2120	1950	6700
140	.1	143	86	10.5	80	2530	2290	5700					
150	.1	143	105	11.6	82	3220	2950	10400					
150	.0+	63	36	10.2	80	1050	940	1900	80	69	2170	2010	8500
160	.1	63	49	11.9	82	1490	1370	4900					
170	.1	63	62	13.4	84	1950	1820	7000					
						TOTAL YIELDS					7720	6390	22300

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 1. CUBIC FEET AND 1. BOARD FEET.
ALL THINNINGS MAY BE NONCOMMERCIAL.
AT INITIAL AGE 70., 4. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 4

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 117., UNDERSTORY.

SITE INDEX 77
THINNING INTENSITY-- INITIAL- 70. SUBSEQUENT- 100.

STND 117 FLUTED ROCK NAVAJO 76 NO DWARF MISTLETOE

		CHARACTERISTICS BEFORE AND AFTER THINNING							PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
70	.0	986	28	2.3	48	980	0	0					
70	.0	429	20	2.9	49	550	0	0	557	8	430	0	0
80	.0	426	45	4.4	55	1050	0	0					
90	.0	421	69	5.5	60	1610	660	0					
90	.0	379	67	5.7	60	1540	660	0	42	2	70	0	0
100	.0	376	98	6.9	65	2290	1580	0					
110	.0	371	126	7.9	69	3060	2450	1600					
110	.0	235	95	8.6	69	2340	1990	1600	136	31	720	460	0
120	.0	233	117	9.6	73	3100	2750	4800					
130	.0	231	139	10.5	76	3890	3520	9400					
130	.0	139	68	9.5	74	1840	1630	2500	92	71	2050	1890	6900
140	.0	138	86	10.7	77	2450	2220	6000					
150	.0	138	105	11.8	79	3100	2850	10100					
150	.0	60	35	10.4	77	1000	900	2000	78	70	2100	1950	8100
160	.0	60	48	12.1	79	1410	1300	4700					
170	.0	60	61	13.6	81	1850	1730	6700					
							TOTAL YIELDS				7220	6030	21700

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 1. CUBIC FEET AND 1. BOARD FEET.
ALL THINNINGS MAY BE NONCOMMERCIAL.

Table 5

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 117., UNDERSTORY.

SITE INDEX 77
THINNING INTENSITY-- INITIAL- 80. SUBSEQUENT- 100.

STND 117 FLUTED ROCK NAVAJO 76

CHARACTERISTICS BEFORE AND AFTER THINNING									PERIODIC INTERMEDIATE CUTS				
STAND AGE (YEARS)	DMR	TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
70	.1	986	28	2.3	48	980	0	0					
70	.0+	524	18	2.5	49	570	0	0	462	10	410	0	0
80	.1	520	60	4.6	58	1420	0	0					
90	.1	511	97	5.9	66	2390	1140	0					
90	.0+	349	73	6.2	67	1790	990	0	162	24	600	150	0
100	.1	346	103	7.4	71	2600	1960	0					
110	.1	341	128	8.3	75	3440	2850	2000					
110	.0+	235	95	8.6	75	2560	2170	1800	106	33	880	680	200
120	.1	233	117	9.6	79	3380	2990	5300					
130	.1	231	139	10.5	82	4210	3810	10100					
130	.0+	139	68	9.5	80	2000	1770	2700	92	71	2210	2040	7400
140	.1	138	86	10.7	83	2650	2400	6500					
150	.1	136	105	11.8	85	3340	3070	10900					
150	.0+	60	35	10.4	83	1080	980	2200	78	70	2260	2090	8700
160	.1	60	48	12.1	85	1520	1410	5100					
170	.1	60	61	13.6	87	1990	1860	7200					
							TOTAL YIELDS				8350	6820	23500

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 1. CUBIC FEET AND 1. BOARD FEET.
ALL THINNINGS MAY BE NONCOMMERCIAL.
AT INITIAL AGE 70., .4. PERCENT OF THE TREES WERE INFECTED WITH DWARF MISTLETOE.

Table 6

YIELDS PER ACRE OF SOUTHWESTERN PONDEROSA PINE, STAND NUMBER 117., UNDERSTORY.

SITE INDEX 77

THINNING INTENSITY-- INITIAL- 80. SUBSEQUENT- 100.

STND 117 FLUTED ROCK NAVAJO 76 NO DWARF MISTLETOE

STAND AGE (YEARS)	DMR	CHARACTERISTICS BEFORE AND AFTER THINNING: TREES NO.	BASAL AREA SQ.FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.	PERIODIC INTERMEDIATE CUTS: TREES NO.	BASAL AREA SQ.FT.	TOTAL VOLUME CU.FT.	MERCHANTABLE VOLUME CU.FT.	SAWTIMBER VOLUME BD.FT.
70	.0	986	28	2.3	48	980	0	0					
70	.0	499	21	2.8	49	610	0	0	487	7	370	0	0
80	.0	495	62	4.8	58	1450	0	0					
90	.0	486	99	6.1	66	2410	1270	0					
90	.0	321	79	6.7	67	1900	1260	0	165	20	510	10	0
100	.0	318	106	7.8	71	2640	2090	0					
110	.0	314	130	8.7	75	3500	2990	3600					
110	.0	204	98	9.4	76	2700	2370	3600	110	32	800	620	0
120	.0	203	120	10.4	79	3490	3150	7900					
130	.0	203	141	11.3	82	4320	3950	13700					
130	.0	121	70	10.3	81	2070	1870	4200	82	71	2250	2080	9500
140	.0	121	87	11.5	83	2700	2480	8700					
150	.0	121	105	12.6	85	3360	3120	11500					
150	.0	52	35	11.1	83	1080	980	2900	69	70	2280	2140	8600
160	.0	52	46	12.8	86	1490	1380	5200					
170	.0	52	58	14.3	87	1910	1800	7200					
						TOTAL YIELDS					8120	6650	25300

MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4.0-INCH TOP.
BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
INITIAL THINNING MUST BE FROM BELOW.
DWARF MISTLETOE RATING ABOVE WHICH PERIODIC THINNINGS WILL NOT BE EXECUTED - 3.0.
MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 1. CUBIC FEET AND 1. BOARD FEET.
ALL THINNINGS MAY BE NONCOMMERCIAL.

Table 7